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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference #24310 TNB:DMW	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International application No. **PCT/AU 98/00046**	International filing date 29 January 1998	Priority Date 29 January 1997
International Patent Classification (IPC) or national classification and IPC **Int. Cl.**[6] B42D 15/00; B44F 1/12; B41M 3/14		
Applicant (1) SECURENCY PTY LTD (et al) (2) GRATION, Ronald Gibson et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of **three** sheets, including this cover sheet.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 5 sheet(s).

3. This report contains indications relating to the following items:

I	[X]	Basis of the report
II	[ ]	Priority
III	[ ]	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	[ ]	Lack of unity of invention
V	[X]	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	[ ]	Certain documents cited
VII	[ ]	Certain defects in the international application
VIII	[ ]	Certain observations on the international application

Date of submission of the demand 8 May 1998	Date of completion of the report 7 October 1998
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. (02) 6285 3929	Authorized Officer **MEGAN BOWDEN** Telephone No. (02) 6283 2433

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU 98/00046

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☐ the international application as originally filed.

☒ the description, pages 4 and 5, as originally filed,
Pages , filed with the demand,
Pages 3, filed with the letter of 25 September 1998,
Pages 1 and 2, filed with the letter of 15 October 1998.

☒ the claims, Nos. , as originally filed,
Nos. , as amended under Article 19,
Nos. , filed with the demand,
Nos. 1-8 (part), filed with the letter of 20 August 1998,
Nos. 8 (part)-14, filed with the letter of 25 September 1998.

☐ the drawings, sheets/fig , as originally filed,
sheets/fig , filed with the demand,
sheets/fig , filed with the letter of ,
sheets/fig , filed with the letter of .

2. The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

International application No.
PCT/AU 98/00046

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-14	YES
	Claims	NO
Inventive step (IS)	Claims 1-14	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-14	YES
	Claims	NO

2. Citations and explanations

NOVELTY (N) and INVENTIVE STEP (IS): Claims 1-14

The invention of the amended claims is a printed document having a substrate to which a reflective, or brightly-coloured layer is applied to directly as part of a printing process and a raised printed image is applied to the reflective or brightly-coloured layer. The raised image is not produced by embossing. It has a height of at least 5 μm and is visible from all angles of the document.

No individual citation or obvious combination of citations disclose all the features of the invention.

The closest art of:

US 4420515

discloses a printed document having a brightly-coloured or reflective layer applied directly to a substrated and a raised image is produced on the brightly-coloured or reflective layer by embossing.

PRINTED MATTER PRODUCING REFLECTIVE INTAGLIO EFFECT

Field of the Invention

This invention relates to printed matter, including banknotes, security documents and devices, and all other printed matter.

Background of the Invention

The printing industry is constantly looking for printing techniques which produce printed matter which offers additional security or which is visually appealing in various applications.

In the security printing industry, printed matter which exhibits an effect when visually inspected under various light conditions, but which is not capable of replication using known duplicating methods, such as photocopying or scanning, is highly advantageous.

A security document having some of these features is disclosed in U.S. Patent No. 4,420,515 - Amon et al, which includes a metallic film which is printed or embossed to produce a latent image which is viewed to verify the authenticity of the document. However, the process by which this document is produced requires a number of complex steps to apply the metallic film to the substrate before printing and embossing, and since it would be impractical to incorporate these application steps in the usual document printing process, difficulties will be experienced in making the process commercially attractive. Furthermore, the image produced by the printing and embossing of the metallic film is a latent image which may require specific conditions for viewing and verification.

The introduction of banknotes printed on polymer substrates has introduced a further dimension to the security printing industry, and the present invention seeks to provide a further improvement in banknotes and other security devices exhibiting the abovementioned desirable effect.

Summary of the Invention

The invention provides a printed document or other device comprising a substrate having a surface to which printed matter is applied, a reflective or brightly coloured layer applied directly to said surface as part of a printing process, and a

raised printed image applied to said reflective or brightly coloured layer by a printing process, at least part of said raised printed image having a height of at least 5μm, said raised printed image being enhanced by said reflective or brightly coloured layer when viewed at different angles and under different lighting conditions.

By applying a raised printed image on a reflective or brightly coloured layer, the colour of the printed image is intensified and becomes brighter and is thus enhanced, and an optically variable image is produced when the document is viewed under different lighting conditions or at different viewing angles thereby introducing an optically variable effect of benefit in security applications. Since the reflective or brightly coloured layer is printed on said substrate, or is applied as part of a printing process, it is conveniently incorporated into the printing process to overcome the production shortcomings of the process described in U.S. Patent No. 4,420,515. Furthermore, the effect of the reflective or brightly coloured layer is to enhance the visible image produced by the raised printed regions, rather than to produce a latent image as in the U.S. Patent. The enhanced image is able to be directly viewed and does not require special lighting or other conditions.

The raised printed image is most conveniently produced by an intaglio printing process, although acceptable raised images may be produced by other known printing processes or by a combination of embossing and printing on raised embossed surfaces.

The enhanced image effect referred to above is not achieved if the image is printed using the normal offset printing process, and unless the height of the raised print is at least 5μm, the enhancement produced by the underlying reflective or brightly coloured layer may be insufficient.

In one form of the invention, the substrate is a polymer film and preferably a laminated film of the type used in the production of Australian banknotes. Alternatively, the substrate can be a paper substrate provided it has a smooth surface on which the reflective or brightly coloured layer is applied.

In certain applications or areas of the document, the reflective or brightly coloured layer can be applied directly to the substrate or film, which can have its

own reflective effect, thereby intensifying the reflective properties of the reflective or brightly coloured layer. In other applications, an opaque ink layer may be first applied to the surface of the substrate and the reflective or brightly coloured layer applied to the opaque layer.

Both the reflective or brightly coloured layer and the opaque layer are preferably applied to the substrate by the Gravure printing process, although the reflective or brightly coloured layer may comprise a metallised foil or a brightly coloured foil which is laminated or adhesively applied to the surface of the substrate as part of the printing process.

The invention also provides a method of producing a printed document or other device on a substrate, comprising the step of applying a reflective or brightly coloured layer directly to the substrate as part of a printing process, followed by the step of printing a raised image on the reflective or brightly coloured layer by a printing process.

In one form of the invention, the reflective or brightly coloured layer is an ink layer applied by the Gravure printing process and the raised print is produced by an intaglio printing process. Alternatively, the reflective or brightly coloured layer comprises a reflective or brightly coloured foil which is laminated or adhesively applied to the surface of the substrate as part of the printing process.

In a particularly preferred form of the invention, the reflective or brightly coloured layer is applied to an opaque layer which has been applied to the substrate.

Description of Preferred Embodiment

In a presently preferred form of the invention, a thin polymer substrate comprising laminated polypropylene sheets of the type currently used to produce Australian polymer banknotes firstly has an opaque layer applied to both sides of the substrate by the Gravure printing process, following which a reflective or brightly coloured layer of ink is applied also by the Gravure process.

The ink can comprise any suitable ink which produces a reflective or brightly coloured effect. Suitable inks include the following pigments blended at a 30% to 70% w/w concentration in clear varnish suitable for Gravure application.

Product Name: Bronze Powder Resist Rotoflex Brilliant Rich Pale Gold

Product Description: Flake oxidation resistant metal powder based on a copper-zinc-alloy. (ca 85% Cu, 15% Zn)

Particle Size: <45 μm

Product Manufacturer: ECKART-WERKE GmbH & Co

and

Product Name: Aluminium Powder Super Lining GGT

Product Description: Aluminium Powder (Aluminium based on H-A1 99,5%)

Manufacturer as above.

Printed matter is then applied to the surface of the reflective or brightly coloured layer by the intaglio process to produce a print having raised regions having a height of at least 5μm. The maximum height of the raised region will be determined by the intaglio or other printing/embossing process, but enhanced effects have been observed with raised regions of about 50μm in height. In the present example, the intaglio print can comprise the same prints which are currently applied to Australian polymer banknotes, and these prints are significantly enhanced by the reflective or brightly coloured background and an optically variable image is produced when the intaglio print is viewed under different lighting conditions and viewing angles.

Most printed images will have regions in which substantially parallel lines of raised ink are present. When these lines are viewed at an angle other than directly above the lines, significant enhancement of the image is produced by the reflective or brightly coloured layer. Of course, even if there are no parallel lines, some enhancement of the image is still produced by the underlying reflective or brightly coloured layer.

The reflective effect of the reflective or brightly coloured layer complements the image applied by the intaglio process since the intaglio process transfers a raised print to the substrate, and when such a print is applied to the reflective surface, a novel effect is achieved. An image can be observed by viewing the intaglio image at different angles. If the same intaglio image is printed on a non-reflective substrate, the same effect will not be achieved. The novel image effect may be explained by the following factors:

- When the raised intaglio print is viewed at a specific angle the walls of the intaglio lines hide the background print. The reflective or brightly coloured nature of the substrate intensifies the distinction between the intaglio and reflective substrate revealing and enhancing the raised image.
- The flat/smooth nature of polymer substrate enhanced by a reflective or brightly coloured printed surface, in addition to the raised surface of the intaglio image intensifies both of these properties.

As mentioned above, the reflective or brightly coloured ink can be applied directly to the surface of the polymer substrate since the substrate has its own reflective effect, and this intensifies the reflective effect produced by the reflective or brightly coloured ink layer. If the reflective or brightly coloured ink is applied without an opaque layer, the image will still provide a beneficial effect. Alternatively, if the reflective or brightly coloured ink layer is applied in a region which has been printed on the other side, the printed image will still be enhanced by the underlying reflective layer.

As mentioned above, the reflective ink layer can be replaced by a reflective foil or other film which is laminated or adhesively applied to the substrate and a similar effect is achieved in either case. Suitable reflective foils include those that are applied onto the substrate by hot stamping techniques. These foils typically comprise of a carrier film, a release layer, a metallised layer and an adhesive. Application of the foils is achieved by the hot stamping technique where the foil is adhered onto the substrate at a temperature of, but not limited to, 130°C and high compressive pressure, so that the adhesive is activated and the carrier film is released.

By applying an intaglio print to a reflective or brightly coloured substrate, the security features of the intaglio image are substantially enhanced, resulting in greater distinction of a security image. Both the optically variable intaglio effect and the reflective/glossy nature of the substrate are difficult to replicate by standard duplicating methods, such as colour photocopying or scanning, and the effect produced is aesthetically pleasing.

CLAIMS:

1. A printed document or other device comprising a substrate having a surface to which printed matter is applied, a reflective or brightly coloured layer applied directly to said surface as part of a printing process, and a raised printed image applied to said reflective or brightly coloured layer by a printing process, at least part of said raised printed image having a height of at least 5μm, said raised printed image being enhanced by said reflective or brightly coloured layer when viewed at different angles and under different lighting conditions.

2. The document of claim 1, wherein the raised image is produced by an intaglio printing process.

3. The document of claim 1 or 2, wherein the substrate is a plastics film capable of use to form a banknote, said reflective or brightly coloured layer being printed directly on the substrate to utilise any reflective effect in the film to intensify the reflective properties of the reflective or brightly coloured layer.

4. The document of claim 1 or 2, wherein the substrate is a plastics film capable of use to form a banknote, said reflective or brightly coloured layer being printed over an opaque ink layer applied to the surface of the substrate.

5. The document of claim 1 or 2, wherein the substrate is a paper film having a smooth surface to which said reflective or brightly coloured layer is applied.

6. The document of claim 2 or 5, wherein the reflective or brightly coloured layer is applied by a Gravure printing process.

7. The document of claim 3, wherein the reflective or brightly coloured layer and the opaque layer are applied to the substrate by a Gravure printing process.

8. A method of producing a printed document or other device on a substrate, comprising the step of applying a reflective or brightly coloured layer directly to the substrate as part of a printing process, followed by the step of printing a raised image on the reflective or brightly coloured layer by a printing process.

9. The method of claim 8, wherein the raised image is produced by an intaglio printing process.

10. The process of claim 8 or 9, wherein the substrate is a plastics film capable of use to form a banknote and having a surface reflective effect which intensifies

the reflective properties of the reflective or brightly coloured layer.

11. The method of claim 8, wherein the substrate is a plastics film capable of use to form a banknote, further including the step of printing an opaque layer on the substrate, on which the reflective or brightly coloured layer is printed.

12. The method of claim 8 or 9, wherein the substrate is paper having a smooth surface to which the reflective or brightly coloured layer is applied.

13. The process of claim 10 or 12, wherein the reflective or brightly coloured layer is applied by a Gravure printing process.

14. The process of claim 11, wherein the opaque layer and the reflective or brightly coloured layer are applied by a Gravure printing process.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 98/00046

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: B42D 15/00, B44F 1/12, B41M 3/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B42D 15/-, B41M 3/14, B44F 1/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU:IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT: (INTAGLIO) OR {(BANKNOTE # OR NOTE # OR BILL # OR SECURIT: OR CURRENC:) and (REFLECT: OR BRIGHT: OR MIRROR # OR LUSTR: OR SHINE #)}

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4420515 (AMON et al) 13 December 1983 whole document	1-14
A	WO 96/07547, A1 (LEONHARD KURZ GMBH & CO) 14 March 1996 Abstract	1-14
A	WO 93/22146, A1 (FRANCOIS-CHARLES OBERTHUR GROUP) 11 November 1983 Abstract	1-14

4/8

☐ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
3 March 1997

Date of mailing of the international search report
26 MAR 1998

Name and mailing address of the ISA/AU
AUSTRALIAN PATENT OFFICE
IP AUSTRALIA
PO BOX 200
WODEN ACT 2606
AUSTRALIA Facsimile No.: (02) 6285 3929

Authorized officer
MEGAN BOWDEN
Telephone No.: (02) 6283 2433

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No.
PCT/AU 98/00046

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	4420515						
WO	96/07547	AU	33404/95	CA	2199503	EP	779863
WO	93/22146						

END OF ANNEX

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Australian Industrial Property
Organization
Discovery House
47 Bowes Street
Phillip ACT 2606
AUSTRALIE

in its capacity as elected Office

Date of mailing: 06 August 1998 (06.08.98)	
International application No.: PCT/AU98/00046	Applicant's or agent's file reference: #24310 TNB:ct
International filing date: 29 January 1998 (29.01.98)	Priority date: 29 January 1997 (29.01.97)
Applicant: SECURENCY PTY. LTD.	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:

08 May 1998 (08.05.98)

[ ] in a notice effecting later election filed with the International Bureau on:

_____

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

United States Patent and Trademark Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing: 06 August 1998 (06.08.98)	
International application No.: PCT/AU98/00046	Applicant's or agent's file reference: #24310 TNB:ct
International filing date: 29 January 1998 (29.01.98)	Priority date: 29 January 1997 (29.01.97)
Applicant: GRATION, Ronald, Gibson et al	

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The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer: J. Zahra
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 27 OCT 1998
WIPO PCT

Applicant's or agent's file reference #24310 TNB:DMW	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
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International Patent Classification (IPC) or national classification and IPC

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(2) GRATION, Ronald Gibson et al

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V	[X]	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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VII	[ ]	Certain defects in the international application
VIII	[ ]	Certain observations on the international application

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Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. (02) 6285 3929	Authorized Officer **MEGAN BOWDEN** Telephone No. (02) 6283 2433

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International application No.
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Nos. , as amended under Article 19,
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☐ the drawings, sheets/fig , as originally filed,
sheets/fig , filed with the demand,
sheets/fig , filed with the letter of ,
sheets/fig , filed with the letter of .

2. The amendments have resulted in the cancellation of:

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☐ the claims, Nos.

☐ the drawings, sheets/fig

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4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims **1-14**	**YES**
	Claims	**NO**
Inventive step (IS)	Claims **1-14**	**YES**
	Claims	**NO**
Industrial applicability (IA)	Claims **1-14**	**YES**
	Claims	**NO**

2. Citations and explanations

NOVELTY (N) and INVENTIVE STEP (IS): Claims 1-14

The invention of the amended claims is a printed document having a substrate to which a reflective, or brightly-coloured layer is applied to directly as part of a printing process and a raised printed image is applied to the reflective or brightly-coloured layer. The raised image is not produced by embossing. It has a height of at least 5 μm and is visible from all angles of the document.

No individual citation or obvious combination of citations disclose all the features of the invention.

The closest art of:

US 4420515

discloses a printed document having a brightly-coloured or reflective layer applied directly to a substrated and a raised image is produced on the brightly-coloured or reflective layer by embossing.

PRINTED MATTER PRODUCING REFLECTIVE INTAGLIO EFFECT

Field of the Invention

This invention relates to printed matter, including banknotes, security documents and devices, and all other printed matter.

Background of the Invention

The printing industry is constantly looking for printing techniques which produce printed matter which offers additional security or which is visually appealing in various applications.

In the security printing industry, printed matter which exhibits an effect when visually inspected under various light conditions, but which is not capable of replication using known duplicating methods, such as photocopying or scanning, is highly advantageous.

A security document having some of these features is disclosed in U.S. Patent No. 4,420,515 - Amon et al, which includes a metallic film which is printed or embossed to produce a latent image which is viewed to verify the authenticity of the document. However, the process by which this document is produced requires a number of complex steps to apply the metallic film to the substrate before printing and embossing, and since it would be impractical to incorporate these application steps in the usual document printing process, difficulties will be experienced in making the process commercially attractive. Furthermore, the image produced by the printing and embossing of the metallic film is a latent image which may require specific conditions for viewing and verification.

The introduction of banknotes printed on polymer substrates has introduced a further dimension to the security printing industry, and the present invention seeks to provide a further improvement in banknotes and other security devices exhibiting the abovementioned desirable effect.

Summary of the Invention

The invention provides a printed document or other device comprising a substrate having a surface to which printed matter is applied, a reflective or brightly coloured layer applied directly to said surface as part of a printing process without

embossing the layer, and a raised printed image applied to said reflective or brightly coloured layer by a printing process, at least part of said raised printed image having a height of at least 5μm and being visible from all angles of the document, said raised printed image being enhanced by said reflective or brightly coloured layer when viewed at different angles and under different lighting conditions.

By applying a raised printed image on a reflective or brightly coloured layer, the colour of the printed image is intensified and becomes brighter and is thus enhanced, and an optically variable image is produced when the document is viewed under different lighting conditions or at different viewing angles thereby introducing an optically variable effect of benefit in security applications. Since the reflective or brightly coloured layer is printed on said substrate, or is applied as part of a printing process, it is conveniently incorporated into the printing process to overcome the production shortcomings of the process described in U.S. Patent No. 4,420,515. Furthermore, the effect of the reflective or brightly coloured layer is to enhance the visible image produced by the raised printed regions, rather than to produce a latent image as in the U.S. Patent. The enhanced image is able to be directly viewed and does not require special lighting or other conditions.

The raised printed image is most conveniently produced by an intaglio printing process, although acceptable raised images may be produced by other known printing processes or by a combination of embossing and printing on raised embossed surfaces.

The enhanced image effect referred to above is not achieved if the image is printed using the normal offset printing process, and unless the height of the raised print is at least 5μm, the enhancement produced by the underlying reflective or brightly coloured layer may be insufficient.

In one form of the invention, the substrate is a polymer film and preferably a laminated film of the type used in the production of Australian banknotes. Alternatively, the substrate can be a paper substrate provided it has a smooth surface on which the reflective or brightly coloured layer is applied.

In certain applications or areas of the document, the reflective or brightly coloured layer can be applied directly to the substrate or film, which can have its

own reflective effect, thereby intensifying the reflective properties of the reflective or brightly coloured layer. In other applications, an opaque ink layer may be first applied to the surface of the substrate and the reflective or brightly coloured layer applied to the opaque layer.

Both the reflective or brightly coloured layer and the opaque layer are preferably applied to the substrate by the Gravure printing process, although the reflective or brightly coloured layer may comprise a metallised foil or a brightly coloured foil which is laminated or adhesively applied to the surface of the substrate as part of the printing process.

The invention also provides a method of producing a printed document or other device on a substrate, comprising the step of applying a reflective or brightly coloured layer directly to the substrate as part of a printing process, followed by the step of applying a raised image to the reflective or brightly coloured layer by a printing process so that at least part of said raised image has a height of at least 5μ and is visible from all angles of the document.

In one form of the invention, the reflective or brightly coloured layer is an ink layer applied by the Gravure printing process and the raised print is produced by an intaglio printing process. Alternatively, the reflective or brightly coloured layer comprises a reflective or brightly coloured foil which is laminated or adhesively applied to the surface of the substrate as part of the printing process.

In a particularly preferred form of the invention, the reflective or brightly coloured layer is applied to an opaque layer which has been applied to the substrate.

Description of Preferred Embodiment

In a presently preferred form of the invention, a thin polymer substrate comprising laminated polypropylene sheets of the type currently used to produce Australian polymer banknotes firstly has an opaque layer applied to both sides of the substrate by the Gravure printing process, following which a reflective or brightly coloured layer of ink is applied also by the Gravure process.

The ink can comprise any suitable ink which produces a reflective or brightly coloured effect. Suitable inks include the following pigments blended at a 30% to 70% w/w concentration in clear varnish suitable for Gravure application.

Product Name: Bronze Powder Resist Rotoflex Brilliant Rich Pale Gold

CLAIMS:

1. A printed document or other device comprising a substrate having a surface to which printed matter is applied, a reflective or brightly coloured layer applied directly to said surface as part of a printing process without embossing the layer, and a raised printed image applied to said reflective or brightly coloured layer by a printing process, at least part of said raised printed image having a height of at least 5μm and being visible from all angles of the document, said raised printed image being enhanced by said reflective or brightly coloured layer when viewed at different angles and under different lighting conditions.

2. The document of claim 1, wherein the raised image is produced by an intaglio printing process.

3. The document of claim 1 or 2, wherein the substrate is a plastics film capable of use to form a banknote, said reflective or brightly coloured layer being printed directly on the substrate to utilize any reflective effect in the film to intensify the reflective properties of the reflective or brightly coloured layer.

4. The document of claim 1 or 2, wherein the substrate is a plastics film capable of use to form a banknote, said reflective or brightly coloured layer being printed over an opaque ink layer applied to the surface of the substrate.

5. The document of claim 1 or 2, wherein the substrate is a paper film having a smooth surface to which said reflective or brightly coloured layer is applied.

6. The document of claim 2 or 5, wherein the reflective or brightly coloured layer is applied by a Gravure printing process.

7. The document of claim 3, wherein the reflective or brightly coloured layer and the opaque layer are applied to the substrate by a Gravure printing process.

8. A method of producing a printed document or other device on a substrate, comprising the step of applying a reflective or brightly coloured layer directly to the substrate as part of a printing process, followed by the step of

applying a raised image to the reflective or brightly coloured layer by a printing process so that at least part of said raised image has a height of at least 5μ and is visible from all angles of the document.

9. The method of claim 8, wherein the raised image is produced by an intaglio printing process.

10. The method of claim 8 or 9, wherein the substrate is a plastics film capable of use to form a banknote and having a surface reflective effect which intensifies the reflective properties of the reflective or brightly coloured layer.

11. The method of claim 8, wherein the substrate is a plastics film capable of use to form a banknote, further including the step of printing an opaque layer on the substrate, on which the reflective or brightly coloured layer is printed.

12. The method of claim 8 or 9, wherein the substrate is paper having a smooth surface to which the reflective or brightly coloured layer is applied.

13. The method of claim 10 or 12, wherein the reflective or brightly coloured layer is applied by a Gravure printing process.

14. The method of claim 11, wherein the opaque layer and the reflective or brightly coloured layer are applied by a Gravure printing process.

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20 August 1998

International Preliminary Examining Authority
PO Box 200
WODEN ACT 2606

Sir

RE: SECURENCY PTY LTD
International Patent Application No PCT/AU98/00046
Our Ref: #24310 TNB:HHF

We refer to the Written Opinion dated 4 June 1998 from which we note that the Examiner is of the opinion that all claims are not novel and are lacking in inventive step over the disclosure of US Patent 4420515.

While the Examiner is of the opinion that the citation "explicitly discloses all of the features of claim 1 and claim 8, and that the features of the remaining claims are either disclosed in the citation or merely amount to common general knowledge", we would respectfully submit that the Examiner is inappropriately ignoring a number of distinguishing features which are present in the invention claimed in the present application. To clarify these differences, we enclose an amended set of claims which further highlight those features which differentiate the invention from the disclosure of the citation.

In arriving at the conclusion stated in the opinion, the Examiner appears to have ignored the definition in claim 1 that the reflective or brightly coloured layer is applied to the surface of the document as part of the printing process. This is not possible in the case of the cited process since the application of an extremely thin film of metal particles is a complex process not capable of incorporation into a standard printing process, as evidenced by the description of the process contained in the cited document.

Amended claim 1 now more clearly defines that the raised printed image applied to the reflective or brightly coloured layer is formed by a printing process without embossing the layer and that the raised printed image is visible from all angles of the document. In the disclosure of the citation, it is essential that there be a laminated extremely thin film of metallic particles on the document and that the metallic film has a distinct pattern embossed therein at the time the document is printed, the distinct pattern forming a latent image which is clearly visible from one angle of view and essentially invisible from a second angle of view. In the present invention, the raised printed image is formed without embossing the reflective or brightly coloured layer and is visible from all angles of the document. Thus, as distinct from the disclosure of the citation, the printed document has a printed image which is enhanced by the reflective or brightly coloured layer when viewed at different angles and under different lighting conditions but is not a latent image of the type formed by the invention disclosed in the citation. For this reason, the inventions are essentially totally different, the process of the invention not requiring

embossing and not requiring a latent image to be viewed at a particular angle for verification. In addition, the invention allows the security document to be produced by a relatively straightforward printing process whereas the security document of the citation requires a metallic coating to be applied to the surface of the document by a particularly complex process.

While the disclosure of the document indicates that the document may be printed in any well known manner including intaglio printing, the disclosure specifically requires that a selected portion of the printing means contains the means for embossing a selective pattern on the metallised portions of the document. In other words, the raised printed image of the invention is a true printed image rather than an image embossed in the reflective or brightly coloured layer, and while the embossing is performed during the printing process, it is a separate and distinct part of the printing process rather than an integral element of a standard printing process as in the present invention. Furthermore, the engraving process necessary to produce an embossed image is not the same as the engraving process for producing printing plates for intaglio printing and a special engraving process must be separately performed thereby further adding to the complexity and cost of the prior art process. In the present invention there is no requirement for the embossing of selective patterns on the reflective layer, and this greatly simplifies the manufacturing process.

For the above reasons, the invention now claimed is both novel and inventive over the disclosure contained in the cited document and we request reconsideration and the issuance of a favourable Preliminary Examination Report.

Yours respectfully
CARTER SMITH & BEADLE

Trevor N Beadle

CLAIMS:

1. A printed document or other device comprising a substrate having a surface to which printed matter is applied, a reflective or brightly coloured layer applied directly to said surface as part of a printing process without embossing the layer, and a raised printed image applied to said reflective or brightly coloured layer by a printing process, at least part of said raised printed image having a height of at least 5μm and being visible from all angles of the document, said raised printed image being enhanced by said reflective or brightly coloured layer when viewed at different angles and under different lighting conditions.

2. The document of claim 1, wherein the raised image is produced by an intaglio printing process.

3. The document of claim 1 or 2, wherein the substrate is a plastics film capable of use to form a banknote, said reflective or brightly coloured layer being printed directly on the substrate to utilize any reflective effect in the film to intensify the reflective properties of the reflective or brightly coloured layer.

4. The document of claim 1 or 2, wherein the substrate is a plastics film capable of use to form a banknote, said reflective or brightly coloured layer being printed over an opaque ink layer applied to the surface of the substrate.

5. The document of claim 1 or 2, wherein the substrate is a paper film having a smooth surface to which said reflective or brightly coloured layer is applied.

6. The document of claim 2 or 5, wherein the reflective or brightly coloured layer is applied by a Gravure printing process.

7. The document of claim 3, wherein the reflective or brightly coloured layer and the opaque layer are applied to the substrate by a Gravure printing process.

8. A method of producing a printed document or other device on a substrate, comprising the step of applying a reflective or brightly coloured layer directly to the substrate as part of a printing process, followed by the step of

printing a raised image on the reflective or brightly coloured layer by a printing process.

9. The method of claim 8, wherein the raised image is produced by an intaglio printing process.

10. The process of claim 8 or 9, wherein the substrate is a plastics film capable of use to form a banknote and having a surface reflective effect which intensifies the reflective properties of the reflective or brightly coloured layer.

11. The method of claim 8, wherein the substrate is a plastics film capable of use to form a banknote, further including the step of printing an opaque layer on the substrate, on which the reflective or brightly coloured layer is printed.

12. The method of claim 8 or 9, wherein the substrate is paper having a smooth surface to which the reflective or brightly coloured layer is applied.

13. The process of claim 10 or 12, wherein the reflective or brightly coloured layer is applied by a Gravure printing process.

14. The process of claim 11, wherein the opaque layer and the reflective or brightly coloured layer are applied by a Gravure printing process.

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25 September 1998

International Preliminary Examining Authority
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Sir

RE: SECURENCY PTY LTD
International Patent Application No PCT/AU98/00046
Our Ref: #24310 TNB:DMW

We refer to the second Written Opinion dated 14 September 1998 and lodge herewith substitute specification page 7 with a view to amending claim 8 in the manner intended in our last response, but not amended due to an oversight. We also lodge herewith substitute specification page 3 incorporating the amendment as shown in the attached copy with our hand-written amendment.

We look forward to receiving a favourable International Preliminary Examination Report.

Yours respectfully
CARTER SMITH & BEADLE

Trevor N Beadle

own reflective effect, thereby intensifying the reflective properties of the reflective or brightly coloured layer. In other applications, an opaque ink layer may be first applied to the surface of the substrate and the reflective or brightly coloured layer applied to the opaque layer.

Both the reflective or brightly coloured layer and the opaque layer are preferably applied to the substrate by the Gravure printing process, although the reflective or brightly coloured layer may comprise a metallised foil or a brightly coloured foil which is laminated or adhesively applied to the surface of the substrate as part of the printing process.

The invention also provides a method of producing a printed document or other device on a substrate, comprising the step of applying a reflective or brightly coloured layer directly to the substrate as part of a printing process, followed by the step of applying a raised image to the reflective or brightly coloured layer by a printing process so that at least part of said raised image has a height of at least 5μ and is visible from all angles of the document.

In one form of the invention, the reflective or brightly coloured layer is an ink layer applied by the Gravure printing process and the raised print is produced by an intaglio printing process. Alternatively, the reflective or brightly coloured layer comprises a reflective or brightly coloured foil which is laminated or adhesively applied to the surface of the substrate as part of the printing process.

In a particularly preferred form of the invention, the reflective or brightly coloured layer is applied to an opaque layer which has been applied to the substrate.

Description of Preferred Embodiment

In a presently preferred form of the invention, a thin polymer substrate comprising laminated polypropylene sheets of the type currently used to produce Australian polymer banknotes firstly has an opaque layer applied to both sides of the substrate by the Gravure printing process, following which a reflective or brightly coloured layer of ink is applied also by the Gravure process.

The ink can comprise any suitable ink which produces a reflective or brightly coloured effect. Suitable inks include the following pigments blended at a 30% to 70% w/w concentration in clear varnish suitable for Gravure application.

Product Name: Bronze Powder Resist Rotoflex Brilliant Rich Pale Gold

applying a raised image to the reflective or brightly coloured layer by a printing process so that at least part of said raised image has a height of at least 5μ and is visible from all angles of the document.

9. The method of claim 8, wherein the raised image is produced by an intaglio printing process.

10. The method of claim 8 or 9, wherein the substrate is a plastics film capable of use to form a banknote and having a surface reflective effect which intensifies the reflective properties of the reflective or brightly coloured layer.

11. The method of claim 8, wherein the substrate is a plastics film capable of use to form a banknote, further including the step of printing an opaque layer on the substrate, on which the reflective or brightly coloured layer is printed.

12. The method of claim 8 or 9, wherein the substrate is paper having a smooth surface to which the reflective or brightly coloured layer is applied.

13. The method of claim 10 or 12, wherein the reflective or brightly coloured layer is applied by a Gravure printing process.

14. The method of claim 11, wherein the opaque layer and the reflective or brightly coloured layer are applied by a Gravure printing process.

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15 October 1998

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Sir,

RE: SECURENCY PTY LTD
International Patent Application No PCT/AU98/00046
Our Ref: #24310 TNB:JL

Further to our letter of 25 September 1998, we lodge herewith substitute specification pages 1 and 2, incorporating the amendment made to claim 1 on 20 August 1998. A copy of the hand-written amendments are enclosed.

We look forward to receiving a favourable International Preliminary Examination Report.

Yours respectfully,
CARTER SMITH & BEADLE

Trevor N. Beadle
(Signed by his Secretary in his absence)

PRINTED MATTER PRODUCING REFLECTIVE INTAGLIO EFFECT

Field of the Invention

This invention relates to printed matter, including banknotes, security documents and devices, and all other printed matter.

Background of the Invention

The printing industry is constantly looking for printing techniques which produce printed matter which offers additional security or which is visually appealing in various applications.

In the security printing industry, printed matter which exhibits an effect when visually inspected under various light conditions, but which is not capable of replication using known duplicating methods, such as photocopying or scanning, is highly advantageous.

A security document having some of these features is disclosed in U.S. Patent No. 4,420,515 - Amon et al, which includes a metallic film which is printed or embossed to produce a latent image which is viewed to verify the authenticity of the document. However, the process by which this document is produced requires a number of complex steps to apply the metallic film to the substrate before printing and embossing, and since it would be impractical to incorporate these application steps in the usual document printing process, difficulties will be experienced in making the process commercially attractive. Furthermore, the image produced by the printing and embossing of the metallic film is a latent image which may require specific conditions for viewing and verification.

The introduction of banknotes printed on polymer substrates has introduced a further dimension to the security printing industry, and the present invention seeks to provide a further improvement in banknotes and other security devices exhibiting the abovementioned desirable effect.

Summary of the Invention

The invention provides a printed document or other device comprising a substrate having a surface to which printed matter is applied, a reflective or brightly coloured layer applied directly to said surface as part of a printing process without

embossing the layer, and a raised printed image applied to said reflective or brightly coloured layer by a printing process, at least part of said raised printed image having a height of at least 5μm and being visible from all angles of the document, said raised printed image being enhanced by said reflective or brightly coloured layer when viewed at different angles and under different lighting conditions.

By applying a raised printed image on a reflective or brightly coloured layer, the colour of the printed image is intensified and becomes brighter and is thus enhanced, and an optically variable image is produced when the document is viewed under different lighting conditions or at different viewing angles thereby introducing an optically variable effect of benefit in security applications. Since the reflective or brightly coloured layer is printed on said substrate, or is applied as part of a printing process, it is conveniently incorporated into the printing process to overcome the production shortcomings of the process described in U.S. Patent No. 4,420,515. Furthermore, the effect of the reflective or brightly coloured layer is to enhance the visible image produced by the raised printed regions, rather than to produce a latent image as in the U.S. Patent. The enhanced image is able to be directly viewed and does not require special lighting or other conditions.

The raised printed image is most conveniently produced by an intaglio printing process, although acceptable raised images may be produced by other known printing processes or by a combination of embossing and printing on raised embossed surfaces.

The enhanced image effect referred to above is not achieved if the image is printed using the normal offset printing process, and unless the height of the raised print is at least 5μm, the enhancement produced by the underlying reflective or brightly coloured layer may be insufficient.

In one form of the invention, the substrate is a polymer film and preferably a laminated film of the type used in the production of Australian banknotes. Alternatively, the substrate can be a paper substrate provided it has a smooth surface on which the reflective or brightly coloured layer is applied.

In certain applications or areas of the document, the reflective or brightly coloured layer can be applied directly to the substrate or film, which can have its